

REMARKS

The application has been carefully reviewed in light of the Office Action dated February 7, 2005. Claims 1 to 3, 11 to 15, 17, 19, 21, 32 and 40 to 42 are in the application, of which Claims 1, 21 and 32 are the independent claims. Claims 1, 12, 14, 21 and 32 have been amended to define still more clearly what Applicant regards as his invention. Claim 42 has been added. Favorable reconsideration is respectfully requested.

Claims 1 to 3, 11 to 15, 17, 19, 21, 32, 40 and 41 have been rejected under 35 U.S.C. § 103(a) as being obvious from U.S. Patents 6,219,015 (Bloom et al.), 6,545,659 (Kuramoto) and 5,371,618 (Tai et al.), in combination.

The present invention relates to color-display technology in which a space modulator is controlled by image data while being illuminated by light of various colors successively. As is described in the application, conventional technology of this kind suffers from some degree of image quality degradation, either through less than desirable luminance or through color mixing (i.e., the illumination of part of the space modulator with light of one color while it is operating to display image data of a different color component). These problems occur due to the conventional technique of illuminating the space modulator, in which a color-filter disk like that shown in Fig. 8 is used to control the color of light being used to illuminate the modulator. As the boundary between two different color regions of the disk passes over the modulator, part of the latter is illuminated with light of one color, and the rest, with light of another color. Because the data being used to drive the modulator belongs to one or the other of those two colors, it is inevitable that part of the space modulator is using (say) green data while being illuminated with blue light. One known way to avoid such mixing, described in the application, is not to drive the modulator while it is being traversed by two colors of light, but this has the mentioned drawback of resulting in lower total luminance of the display.

Independent Claim 1 is directed to an image display apparatus that comprises space modulation means for modulating incident light according to input display data and outputting the modulated incidence light. Illumination means illuminate the space modulation means with light, and projection means project light emitted from the space modulation means upon an image display screen. The illumination means repeat one illumination cycle having a plurality of periods, which include at least periods for illuminating the space modulation means with lights of first, second and third colors which are different from white and different from one another, and two discontinuous periods for illuminating the space modulation means with a white light. In addition, the space modulation means modulate respectively the lights of the first, second and third colors and the white light, and during the one illumination cycle, the period for illuminating the space modulation means with the white light starts after each one of the periods for illuminating the space modulation means with the lights of at least two of the first, second and third colors, and before the period for illuminating the space modulation means with the light of the other color.

Bloom relates to a use of an array of grating light valves to produce multicolor images. The *Bloom* grating 10 (see Figs. 1-3) has reflective portions that, under control of an applied voltage, can be spaced apart in parallel planes that are either one-half wavelength (see Fig. 2) or one-quarter wavelength (see Fig. 3) apart. In the position shown in Fig. 2, the result is constructive superposition of the reflected light, while in that of Fig. 3, there is destructive interference, so that the only light leaving the grating is diffracted (col. 4, lines 44-67). As discussed at col. 8, line 66, through col. 9, line 9, a grating of this sort, illuminated with white light, can be used to produce a desired color; thus, a set of three such gratings, respectively used to produce blue, red and green output light, can be used for a projection display or the like.

It should be noted, however, that nothing has been found, or pointed out, in *Bloom* that would teach or suggest using the grating to produce output white light with which to illuminate such display. On the contrary, the use of a set of three gratings for a pixel to produce the desired three primary colors, is in lieu of a color filter wheel or the like used conventionally (see Fig. 8 of the present application), and over which the present invention is an advance. It is not at all apparent in what way a person of merely ordinary skill would consider that anything in *Bloom* would provide a teaching as to how to improve such a color filter array; rather, it appears that *Bloom* teaches that one should avoid such an approach altogether, and instead use multiple gratings, as discussed in the passage of that patent just cited.

In any event, it is plain that Claim 1 is allowable over *Bloom*, taken alone.

Kuramoto relates to an arrangement in which a light valve is irradiated with light from a white light source. As is apparent from col. 3, lines 58 *et seq.*, and Fig. 4B of *Kuramoto*, the light from the white light source is filtered by a color sequence 9. Accordingly, the white light itself is not incident onto the light valve. In that respect, *Kuramoto* is different from the apparatus of Claim 1. Moreover, even if *Kuramoto* and *Bloom* are combined in the fashion proposed in the Office Action, and even assuming such combination would even be possible (or permissible), any conceivable result would still be an arrangement in which some kind of device is used to generate light of each of three primary colors, and in which only those three primary colors, and never white light, is used to illuminate a space modulator.

Further, according to Claim 1, a period for illuminating the modulation means or modulator with the white light is arranged to start after each one of the illumination periods of at least two colors of the lights. Thereby, undesirable phenomenon due to a color mixture can be reduced. Of course the above feature of the present invention has neither been disclosed nor suggested by *Kuramoto*.

For all these reasons, it is believed to be clear that, even assuming a combination of *Bloom* and *Kuramoto* would be permissible, or even possible, the result would not remotely meet the terms of Claim 1.

Tai relates to a color LCD in which each pixel can be subdivided into at most two adjacent, discrete subpixels. In the embodiment specifically relied upon in the Office Action, the pixel (see Figs. 1 and 2) has a first optical assembly 1 that consists of a dual compensating STN (super twisted nematic liquid crystal) cell system, which is used to generate a first primary color (col. 5, lines 14-18), and two additional optical assemblies 2 and 3, which each include a single STN cell and a retardation film (col. 5, lines 22-30). The two latter assemblies 2 and 3 are used to generate a second and a third primary color, respectively (col. 5, lines 24-47). According to *Tai*, appropriate selection of which of the four cells are actuated (two in assembly 1, and one each in assemblies 2 and 3) permits one to produce any of the three primary colors, any of three secondary colors, white, and a black with a high contrast (col. 5, lines 45-67).

A careful review of *Tai* (and the other two documents applied against Claim 1), has not, however, revealed any suggestion whatsoever of illuminating a space modulator with white light after a first primary color and before a second primary color, and again after the second primary color and before the third. Nothing in that patent (or in either *Bloom* or in *Kuramoto*) even hints at any advantage to be obtained by doing so, much less provides any suggestion of a structure that could be used for doing so. Rather, in *Bloom*, white light is directed at a grating in order to use the grating to produce any of three primary colors, which themselves can be used as the display. The same is true of the *Kuramoto* device. In *Tai*, as well, the approach adopted involves producing three primary colors (using LCDs, in *Tai*) and using these colors in various combinations, and with various filters, to produce additional colors, white and black.

In all three devices, that is, the colors produced in this way are the colors that actually make up the displayed image itself. Nothing has been found, or pointed out, in any of those patents that even hints at illuminating a space modulator in the manner recited in Claim 1, much less at a structure like that recited in Claim 1. The Examiner's attention is directed to the fact that in Claim 1, the illumination means illuminate the recited space modulation means, and that it is the illumination means that are recited as performing such illumination using a primary color, then using white, then using another primary color, and then using white again. Nothing found in any of the three patents under discussion above has even a remote connection with such illumination means, and certainly nothing in those three patents, whether considered singly or in any possible combination, would have led a person of merely ordinary skill to illumination means like those recited in Claim 1.

Accordingly, Applicant believes that Claim 1 is clearly allowable over those three patents.

Independent Claim 21 is a corresponding method claim, and independent Claim 32 contains recitations similar to those of Claim 1, such that the arguments presented above apply to Claims 21 and 32 as well. Thus, all three independent claims are believed to be clearly allowable over any possible combination of those three patents.

A review of the other art of record has failed to reveal anything which, in Applicant's opinion, would remedy the deficiencies of the art discussed above, as references against the independent claims herein. Those claims are therefore believed patentable over the art of record.

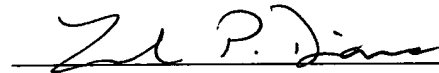
The other claims in this application are each dependent from one or another of the independent claims discussed above and are therefore believed patentable for the same reasons. Since each dependent claim is also deemed to define an additional aspect of

the invention, however, the individual consideration or reconsideration, as the case may be, of the patentability of each on its own merits is respectfully requested.

In view of the foregoing amendments and remarks, Applicant respectfully requests favorable reconsideration and early passage to issue of the present application.

Applicant's undersigned attorney may be reached in our New York office by telephone at (212) 218-2100. All correspondence should continue to be directed to our below listed address.

Respectfully submitted,



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